BULLETIN NO. 3

COMMONWEALTH OF PENNSYLVANIA
BOARD OF FISH COMMISSIONERS

The Aquatic Life Maintained at the Wayne Fish Hatchery for Educational Purposes

BY

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Deputy Commissioner of Fisheries

HARRISBURG
1927

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COMMONWEALTH OF PENNSYLVANIA
BOARD OF FISH COMMISSIONERS

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Administration Building and Hatching House at the Wayne Fish Hatchery, Pleasant Mount, Wayne County, Pennsylvania.

THE AQUATIC LIFE MAINTAINED AT THE WAYNE FISH HATCHERY FOR EDUCATIONAL PURPOSES

BY
C. R. BULLER
Deputy Commissioner of Fisheries

INTRODUCTION

The State fish hatcheries, six in number, with a program of ten additional ones, are owned and operated by the Commonwealth of Pennsylvania. They are under the jurisdiction of a Board of Fish Commissioners with headquarters at Harrisburg. Each hatchery is supervised by a resident superintendent who is responsible for the rearing of the fish and the maintenance of his plant.

Two of the many duties of the Board of Fish Commissioners are: the rearing of the fish for the stocking of our public waters, and the enforcement of our fish laws. The law enforcement alone is a stupendous task. Educating the fishermen to be real conservationists and sportsmen, particularly the youthful angler, has been and will be of great assistance to the enforcement officers. When the anglers, both present and future, learn something of the life history of the fish for which they are angling—how they are artificially propagated and distributed from the hatcheries; of what value, economic and otherwise, is the common life found in and about the lakes and streams—then and only then can they be called real conservationists and fishermen.

The educational work is carried on in a number of different ways, by portraying in motion pictures the life history and artificial propagation of various species, by distributing pamphlets and bulletins on the conservation of fish life, by talks and lectures by men qualified in the work, by sending specimens of fish and fish eggs to our institutions of learning for research work, and by maintaining aquariums in the major hatcheries where many forms of aquatic life can be seen and studied at close range. The aquarium with which this pamphlet deals is maintained in the Administration Building at the Wayne Hatchery. This buliding is open to the public from seven a. m. to six p. m. daily.

In this building also can be seen the different methods used in artificially incubating the fish eggs. Although guides are kept at the hatchery for the convenience of visitors, each display tank is plainly marked with the name and brief history of the specimens they contain. However, when instructors bring classes for study, by making an appointment with the superintendent, competent guides will be furnished to explain the workings of the hatchery.

PENNSYLVANIA'S HATCHERIES

Although it is not the intent of this pamphlet to go into detail regarding the workings of the various hatcheries, but simply to explain what can usually be seen in the display tanks at the Wayne Hatchery, it was thought advisable to include this brief outline of the hatchery work, as it is hoped it will answer the common questions asked by visitors.

Following are the kind and location of the present hatcheries and a brief outline of the methods used in propagation:

The Corry Hatchery located at Corry, Erie County, is devoted to the propagation of the brook trout.

The Erie Hatchery, Erie County, is used to help maintain fishing in Lake Erie by stocking the Lake with such species of fish as are commonly fished for. In addition to this it propagates the yellow perch and pike-perch for distribution in our inland waters.

At the Bellefonte Hatchery, Bellefonte, Centre County, are reared the brook and brown trout.

The Union City Hatchery, Union City, Erie County, is a warm water fish hatchery. By the term warm water fish hatchery is meant a plant where the species commonly found in our lakes, ponds and rivers are reared. This plant is devoted chiefly to the yellow perch, pike-perch, sunfish and catfish.

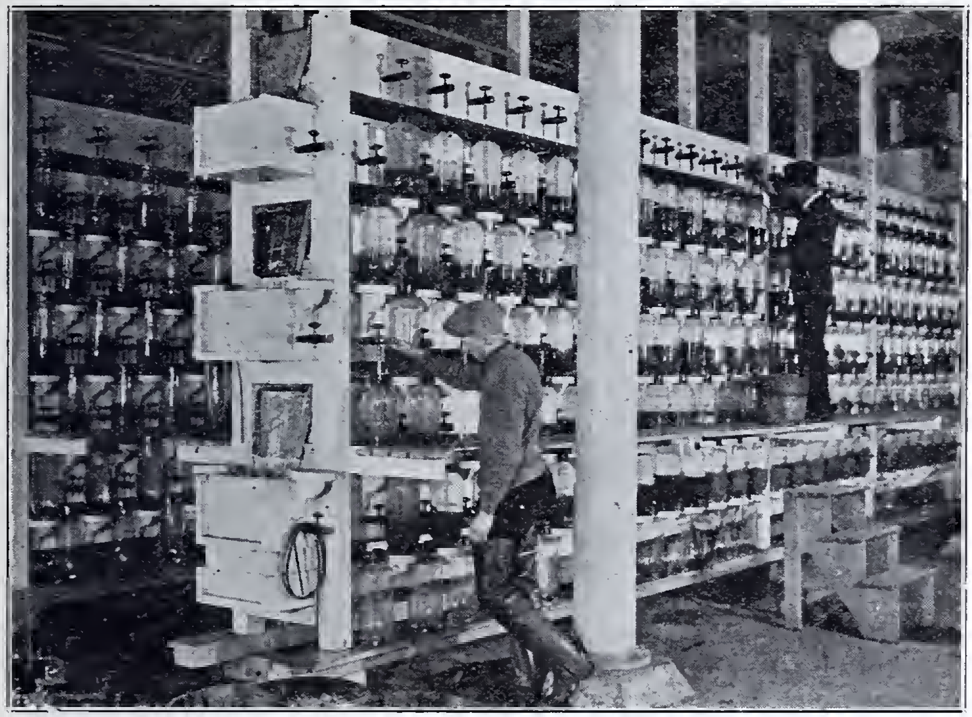
The Torresdale Hatchery, Torresdale, Philadelphia, is another warm water hatchery where the yellow perch, pike-perch, catfish, sunfish and minnows are reared. At this plant much effort is devoted to the propagation of the minnow, the chief function of the minnow being that of forage for other fish. Through the agencies of man, conditions in many of our streams have become such that the Board of Fish Commissioners is compelled to help feed the fish they release. This is done by stocking with minnow life.

The Wayne Hatchery, located at Pleasant Mount, Wayne County, is a combination hatchery devoted to the propagation of trout and warm water fishes. The warm water fishes propagated are the black bass, yellow perch, pike-perch, sunfish, catfish and minnows. At the present time, this is Pennsylvania's major fish hatchery. At this plant approximately four hundred acres of water are used in the fish cultural work. The ponds in close proximity to the hatchery building are used for trout culture and nursery ponds for the warm water fishes. The majority of the brood fish are retained in larger units located within a radius of three miles from the central station.

METHODS USED IN HATCHING FISH EGGS

The fish propagated at the hatcheries reproduce by depositing eggs. These eggs are secured by one of the three following methods:

First, by artificial extrusion, where the eggs of the female and milt of the male are artificially taken from the parent fish by exerting pressure along their ventral surfaces. This is done without injury to the fish, and is used in securing the eggs of various species of trout, pike-perch, white fish, cisco, blue pike, muskallunge, and several species of minnows.

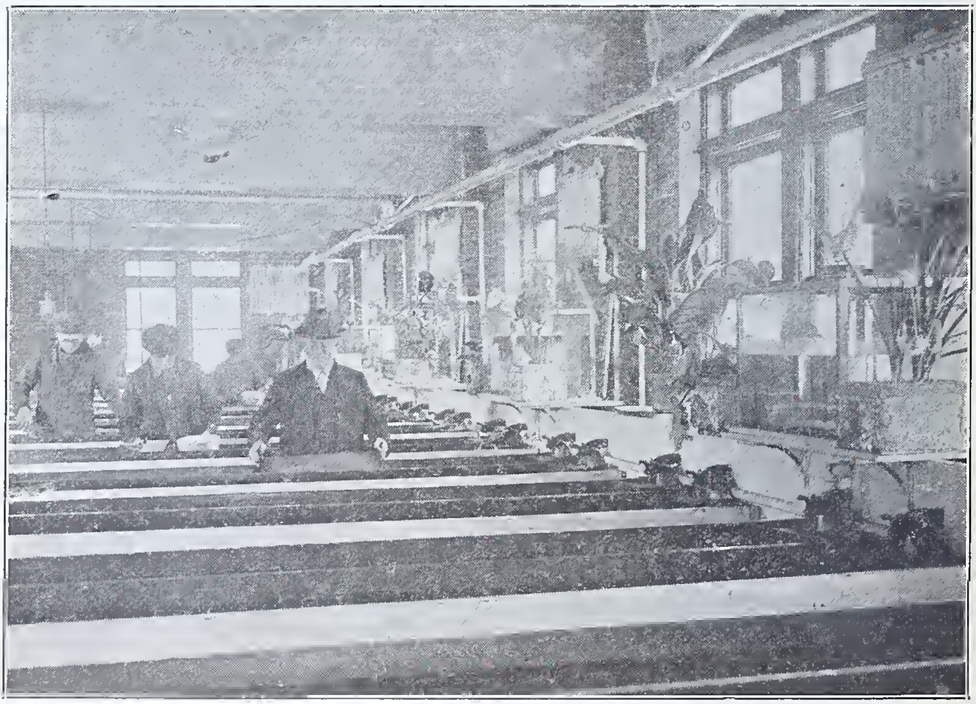


A HATCHING BATTERY IN ONE OF PENNSYLVANIA'S MODERN FISH HATCHERIES USED IN HATCHING THE EGGS OF THE WHITE FISH, CISCO, MUSKALLUNGE, PIKE-PERCH, YELLOW PERCH AND VARIOUS SPECIES OF MINNOWS.

Second by permitting the parent fish to deposit their eggs in the natural way of artifically constructed spawning beds. After the eggs are extruded and fertilized by natural processes, they are collected and artifically hatched; examples, yellow perch, and in certain cases the catfish.

Third, by permitting the parent fish to build their own nests, deposit their eggs therein, care for the eggs and very young fish in their own way; then after the baby fish have attained a certain size separating them from the parents; examples, sunfish and black bass.

Fish eggs are artifically hatched or incubated in two ways, either on a hatching battery or in hatching troughs. A hatching battery consists of a number of parallel troughs placed one above the other with an intervening space of about four inches between each trough. The troughs are arranged in tiers, the height and length depending upon the number of jars to be used. While the battery is in use, water is kept running through the series. The water intake is at one end of the top and flows from one trough to the other until the bottom trough is reached; hence the water is conducted into the fish storage tanks. About every twelve inches in the series of troughs a one-half inch spigot is placed. Below each spigot and resting on the next trough is a small shelf. On this shelf directly under each spigot is placed a glass hatching jar.



HATCHING TROUGHS AT ONE OF PENNSYLVANIA'S STATE HATCHERIES USED IN THE INCUBATION OF TROUT EGGS.

The hatching jar is a cylindrical glass jar fourteen inches high and six inches in diameter. The bottom of the jar is rounded in such a manner that the water striking the center of the bottom is distributed equally in all directions in an upward current. The overflow is at the top of the jar and the water is fed through an inserted glass tube extending from the spigot to within about one-half inch of the bottom. By this arrangement when the eggs are placed in these containers, the upward lift of the water has a tendency to keep the eggs in a constant rolling motion. The battery process is simply an imitation of nature's way of caring for the eggs, the movement in the jar replacing the wave motion in the lake or pond.

The eggs of the pike-perch, yellow perch, white fish, cisco, etc., are incubated in this manner.

The hatching troughs consist of a series of troughs about fourteen feet long, eighteen inches wide and eight inches deep, with a depth of approximately four inches of water in each trough. The eggs are placed on specially constructed wire trays or baskets and submerged to a depth of several inches in the troughs of running water. By this method species that require very little, if any, motion, as the trout eggs, are hatched.

THE AQUARIUM

Not all of the specimens on display are native of Pennsylvania, nor are they all propagated by the Board of Fish Commissioners. However, in securing these specimens, the thought has been to have on exhibition only such life as that directly or indirectly bearing on fish or fish culture. (See illustrations of hatching battery and hatching troughs)

BROOK TROUT

Of all North American fish, the brook trout is perhaps the most widely known, and by many is considered the most beautiful and active of the American trout, of which there are a number of different species. Of the trout the brook trout enjoys the widest distribution and is most commonly known and fished for. Its natural range is the mountain streams and cool mountain lakes from Maine to northern Georgia, the mountain ranges of Alabama, westward through the Great Lakes region to Minnesota, and in Canada from Labrador to the Saskatchewan. Since its artificial propagation by the various Fish Commissions, it has been introduced into many new waters both in this and in foreign countries where it has done remarkably well.

The brook trout was one of the first fish artificially hatched and reared by the Commonwealth of Pennsylvania. The first state hatchery was built in 1871 at Donegal Springs, Lancaster County, Pennsylvania. In the early days of the hatchery, trout were released in our public streams when they were but a few weeks old. At this time most of the trout streams were in their natural state, few havng been molested by the activities of man; but at the present time, owing to our thoughtlessness and lack of foresight, conditions have become such that our trout streams no longer can be used as nursery sites for the baby fish. This being the case, the Board of Fish Commissioners is compelled to retain the fish at the hatcheries until they are able to take care of themselves when released. The size at which they are released has gradually been increased from year to year until at the present time no trout are sent out for distribution, except those that have attained a length of four inches or over.

In Pennsylvania they spawn or produce eggs from October to December. The eggs are obtained and fertilized by artificial extrusion. This process neither injures the male or female if properly done. A female will produce from two hundred and fifty to two thousand eggs, depending upon her size and age. The eggs are hatched in the hatching troughs; the period of incubation is from forty to ninety days, depending upon the temperature of the water.

BROWN TROUT

The brown trout is not a native of North America, but was introduced from Europe in about 1883. At the time of its introduction it was known in this country as the Von Behr trout, Von Behr being the man through whose instrumentality the eggs were obtained from Europe. The first brown trout eggs were hatched by the State of Pennsylvania in 1884 and 1885. A consignment of ten thousand eggs were received direct from Germany for the Corry Hatchery. Since that time through the efforts of the Federal and various State Fish Commissions, this newcomer has been introduced into many sections of the United States. and it has thrived with marked success in a number of localities. Its artificial propagation is practically the same as that of the brook trout.

RAINBOW TROUT

The rainbow trout is not indigenous to the eastern waters of the United States. The lakes and streams along the western coast are its natural home. There is considerable variation in the form and the color of this species, depending upon its habitat. Its introduction into Pennsylvania has not been so successful as the fish culturist hoped it would be. In the majority of streams repeated plantings of rainbow trout have failed to bring results. To what this failure can be attributed is not generally known; some authorities are of the opinion that they escape from their new homes where perhaps conditions are not desirable and enter the sea. At the present time, very few rainbow trout are propagated in Pennsylvania. With very few exceptions. the results obtained were not commensurate with the money and efforts spent. In the artificial propagation of this fish, the eggs are obtained by artificial extrusion and are incubated in the hatching troughs.

SMALL MOUTH BLACK BASS

For its size, the small mouth black bass is considered the gamest of all Pennsylvania fish. For this reason, it is much sought after by the angler, and Pennsylvania fish culturists are exerting every effort possible to help maintain good bass fishing in waters that are best adapted to this voracious fish. Bass sent from the hatcheries for stocking purposes range in length from one and one half to six inches. To rear a large number of bass to this size is one of the most difficult problems confronting the fish culturists today. One of the many difficulties encountered is the matter of securing food. To date no artificial food upon which bass will feed and thrive has been discovered; hence all parent bass, as well as the thousands of offsprings are held in the nursery ponds until they are a proper size for distribution, and are fed upon natural food, which consists chiefly of minute aquatic organisms for the very young bass and minnow life for the larger ones. In order to propagate this food, practically the same number of water acres is used as is used to rear the bass.

In Pennsylvania the bass usually spawn in the month of June; the eggs are not artificially extruded but the parent bass are permitted to build their nests and care for the eggs and very young fish. After the baby fish no longer need the attention of the parents, they must be separated, as the parent bass will not hesitate to devour their own young after they leave their protection.

LARGE MOUTH BLACK BASS

In different parts of their range these fish are known by different names; such as, the straw bass, green bass, grass bass, Oswego bass, and yellow bass. They are by preference a fish of the slow moving sluggish streams and lakes. As a game fish, they probably rank next to the small mouth black bass, and throughout the United States, without a doubt, are equally well known to the angler because they enjoy a much wider range. This wide range is probably due to their ability to live under conditions that would not be suitable to the small mouth black bass.

CALICO BASS

At the present time the calico bass enjoys a wide range throughout the United States. It is found in the Great Lakes region and southward from New Jersey to Texas. However, early records tell us that the calico bass was not a native of Pennsylvania but was introduced about 1876. The first consignment was supposed to have been obtained from the vicinity of Newark, Ohio, and to have been planted in the Susquehanna river near Harrisburg. A few years later, other plantings were made in the Juniata near Hollidayburg and in the Monongahela near Pittsburgh. Since that time they have been introduced into a number of Pennsylvania's lakes and ponds where they have afforded fairly good fishing, although they are popular with only a few fishermen. Due to this lack of popularity the Board of Fish Commissioners in recent years has made no effort to propagate them.

ROCK BASS

Apparently, scientists delight to dignify even the most ordinary things of our every day life with high sounding names and titles which require a constant reference to dictionaries to interpret. By the scientist, these fish are called Ambloptotes rupestris (Rabinesque). To most persons they are known as the rock bass, red eye, or goggle eye. They are quite abundant in some of our lakes and streams in Pennsylvania. They spawn in Pennsylvania in May or June. They are of the nest building variety, usually building their nests on gravel bars at the base of old logs, rocks, etc. The nests are protected by the parent fish during the period of incubation and the early stages of the little fish's existence.

BLUEGILL SUNFISH

The bluegill sunfish might be called the aristocrat of the sunfish family. It is one of the largest and most important of the sunfish; it is not uncommon to catch specimens twelve inches in length. Because of its size, gameness and good pan qualities, it ranks very high as a game fish; and for these reasons, it is extensively propagated at the state hatcheries. In Pennsylvania the spawning season is an extended one, usually taking place any time between June fifteenth and August first. The eggs are not artifically extruded, but the parent fish are permitted to build their nests and deposit their eggs in the natural way. The nest consists of a saucer shaped depression cleaned out on the gravel bottom near the shore line. During the period of incubation and the early stages of the baby fish, the parent protects the home with much vigor, driving away all intruders, even such species as the bass or carp.

COMMON SUNFISH

The sunfish family is a large one comprising different varieties, of which perhaps the Pumpkinseed is the best known in Pennsylvania, as it is a common inhabitant of most all lakes or ponds throughout the Commonwealth. It spawns in June and July, the eggs are deposited in the shallow water on nests of gravel. Owing to the small size of the common sunfish the Board of Fish Commissioners makes no effort to propagate them.

PIKE-PERCH

In Pennsylvania, these fish are known as the pike-perch, Susquehanna salmon, yellow pike, or wall-eyed pike. They rank very high as a game and food fish and are extensively propagated by the Board of Fish Commissioners. The pike-perch usually start to spawn about the time the ice leaves the body of water in which they live. At the hatcheries the eggs are artificially extruded from the parent fish and hatched on the hatching battery. At the present time there is no known way to retain a great number of baby pike-perch at the hatcheries for any length of time. For this reason pike-perch are planted in our public waters in the fry or very young stage. In the history of early fishing in Pennsylvania, mention is made of this wonderful fish in Lake Erie, the Susquehanna River, the Delaware and the Allegheny Rivers, and their tributaries; however, in recent years they have been introduced into many inland lakes and ponds where they have thrived and multiplied with marked success.

YELLOW PERCH

Without question the yellow perch is the species most commonly fished for of all Pennsylvania fish. It is preferably a lake or pond fish but is found in some of our larger streams and rivers. It is an early spring spawner, depositing its eggs in long veil-like ribbons upon submerged brush, aquatic plants, etc. At the hatcheries the yellow perch is permitted to deposit its eggs naturally in an artificially constructed spawning pen, After spawning takes place, the eggs are collected from the pen and transferred to the hatching batteries where final incubation takes place. Throughout many sections of Pennsylvania the yellow perch have increased in size and have lost many of their brilliant colors. Pennsylvania fish culturists are endeavoring to increase again the size of the yellow perch. They have produced by selective breeding an exceptionally large strain of brood fish. By the introduction into the public waters of the offspring of these selectively bred fish, it is hoped in time to increase the size of the yellow perch throughout the Commonwealth.

CHAIN PICKEREL

The chain pickerel belong to the pike family, of which there are about seven species in the United States. This species is commonly found in the lakes and ponds of northwestern Pennsylvania. It probably derives its name from the chain-like marking upon its sides.

These fish are built for speed and strength and are colored for protection. They are very greedy and voracious creatures. They live almost exclusively upon fish life, their feeding grounds are among the aquatic plants near the shore line where other small dwellers of the pond must come to seek their food. For this reason they can be rightly called the hawks of Pennsylvania's waters. The spawning season of the chain pickerel in Pennsylvania is the very early spring, and the spawning usually occurs before the ice leaves the body of water they inhabit.

MUSKALLUNGE

In Pennsylvania these fish are found in but few lakes of the Ohio water shed. They grow to a length of from three to four feet, are very voracious and like the pickerel are built for speed and strength In every way they are fitted to live the life they lead; that of a band of bold plunderers. These fish are propagated by the Board of Fish Commissioners but owing to their voracious habits and immense size, they are not planted in any waters where they do not already exist. The eggs are taken by artificial extrusion and hatched on the hatching battery. In no part of their range do they exist in any great numbers. It would be poor economy on the part of the Board to introduce these fish into new waters, as it is not profitable to maintain a few monstrous muskies in a small body of water at the expense of the more desirable fish. It is a known fact that a forty-inch muskie represents many thousands of smaller fish.

GAR PIKE

Science tells us that many thousands of years ago there existed a group of simply formed armor-clad fish called Ganoids. A few remnants of this tribe still exist and the gar pike is one of them. Therefore, it can be looked upon as a living representative of a great number of extinct species which thousands of years ago laid the foundation of our fish life. Their survival probably can be attributed to their wonderful protective coat of armor. The armor consists of diagonal whorls of solid plates of bone, each divided into scale-like sections, and so hinged together that while the fish are fully protected they have abundant freedom of movement. In Pennsylvania, the gar pike are found in Lake Erie and the Delaware River. These cylindrical armor-clad creatures are unfit for food but are of much interest to the educator.

COMMON BULLHEAD

Throughout the United States are found a number of different species of catfish. Of all these the common bullhead is best adapted to the waters of Pennsylvania. For this reason, considerable pond space is devoted to the propagation of this fish. Owing to the wonderful parental instinct of the bullhead, thus far the fish culturists have not been able to improve greatly upon its methods of caring for the eggs and very young fish. This being the case, at the hatcheries the parents or brood fish are permitted to deposit their eggs and care for them and for the very young fish in their own way.

After the baby fish reach a certain age, they are separated from the brood stock and placed in nursery ponds where they can receive the food and care they need. The spawning period of the bullhead in Pennsylvania is generally from May fifteenth to July first. The nest is prepared by digging holes from six inches to twenty-four inches deep and from six to ten inches in diameter in the pond banks. During this home building, the parent fish frequently injure the spines on their dorsal and pectoral fins which results in the death of many of the breeders. To overcome this, the fish culturists furnish the parents with ready built homes in the way of sunken tile, nail kegs, etc.

WHITE CATFISH

While the white catfish enjoys a wide range throughout the United States, it is not well adapted to the lakes and streams of Pennsylvania, and is seldom found other than in the Delaware River.

COMMON EEL

The common eel is a fresh water fish whose home is in the rivers, streams and lakes but which goes down to salt water to spawn. Fish that leave the fresh water and enter the ocean to spawn are known as Catadromous fish. The fact that the eel seeks salt water to reproduce does not imply that all mature eels leave the fresh water each fall for this purpose. It might be said that only a small percentage each year have a calling to leave their fresh water homes for the purpose of reproduction. The upward migration of the young eels returning from the salt water takes place in the spring of the year. The largest eel caught in the vicinity of the Wayne Hatchery measured thirty-four and one-half inches in length and weighed seven and one-half pounds.

SUCKER

The sucker family is a large one, there being about sixty-eight species found in the fresh waters of North America. They are widely distributed throughout the United States, practically every state has several varieties. Although the sucker cannot be considered a game fish, the larger varieties are much sought as food fish. Perhaps the value of the sucker family as a whole lies in its utilization as food for the more desirable species of fish. The habits of all species of the sucker family are much the same. They are bottom feeders, feeding chiefly upon vegetable matter and soft forms of animal life; such as, worms, larvae, and eggs of various kinds. They are early spring spawners and nearly all have the habit of running up stream at this time.

STICKLEBACK

These pugnacious little fish, armed with their sharp spines, are found in the fresh and brackish waters of the north temperate zone. In Pennsylvania they are most common in the lower Delaware and its tributaries. To the aquarist they are of interest because of their peculiar nest building habits. At the approach of spawning season the male sets to work to build the home. He is the architect, contractor, and workman. After the site has been selected, which will probably be among the stems of aquatic plants, he cements together with a mucous or cement that he has the power of secreting, bits of plants, sticks, sand, etc., into a somewhat rounded, barrel-shaped structure with space provided for an entrance. After the home has been completed he entices a female to enter and deposit her eggs. After this operation is completed, she is driven forth and the second female induced to enter. This is kept up until the home is very nearly filled with eggs. During the period of incubation, the male fish is the sole protector of the home, being ready to give battle to all comers.

LIVE-BEARING TOP MINNOWS

With the great majority of fish, reproduction takes place by the female depositing her eggs on suitable nests and the male fertilizing them by entruding the milt in and about the ova. However, these interesting little fish are an exception. They are known as live-bearing. As the name implies, instead of depositing eggs, they bear their young alive much as do the higher forms of animal life. They are commonly found in the warmer climates of the United States, and are said to be very useful in their natural habitat as they feed upon mosquito larvae.

STURGEON

The sturgeon, like the gar pike, belongs to the family of Ganoid fishes. In Pennsylvania, species of sturgeon are found in Lake Erie and the Delaware River. They grow to a very large size and rank very high on the market as a food fish. In localities where they are caught in large numbers, from the eggs of these fish is made the commercial product called caviar.

Educators tell us that the sturgeon, in various forms, have survived since the Devonian age, or the age of fishes thousands of years ago. This great fish which is supposed to have survived all preceding ages is now threatened to be exterminated through the agencies of man. Prior to 1870 the waters were teeming with them. At that period they were not considered of any food value and tons of them were used for fertilizer. Later the real value of this fish and the edible qualities of the eggs were established. From that time on the sturgeon have rapidly been disappearing.

GOLDEN SHINER

These little fish with their beautiful golden tints are rather unfortunate, because nature intended them as a food for other fish providing them with their brilliant colors, which make them attractive and easily seen by the more fortunate members of the finny tribe. The golden shiner is one of the minnows propagated at the hatchery as forage for black bass. It was selected because it spawns at the proper time of the year so that its offsprings can be used for food for the baby bass; and because it is very prolific and not considered destructive to other fish life.

GERMAN CARP

In the early days of the fish hatcheries, carp were introduced from Europe with the thought that they would make desirable fish for home pond culture. Pennsylvania secured a supply of brood stock and introduced the offspring into a number of privately owned ponds. However, the carp did not come up to the expectations of the fish culturists, and their propagation at the state hatcheries was discontinued a number of years ago.

The carp on exhibition has had a varied and interesting career. His entire life has been spent at a fish hatchery usually under very unnatural conditions. He is known to be over twenty-five years old. He was born at the Allentown Hatchery, which at that time was controlled by the State. After having reached the age of several years he was transferred to the Corry Hatchery. When the construction of the Wayne Hatchery was undertaken in 1904 he was among the fish in the first consignment to be brought here.

GOLDFISH

In the propagation of fish the chief efforts of the Board of Fish Commissioners are devoted to the rearing of food and game fish; however, the demands for goldfish for exhibition purposes in public institutions, such as schools and hospitals and in parks have increased to so great an extent that it has become necessary to propagate a limited number of common goldfish to supply the demands. No efforts are made to propagate the many fancy breeds existing. The fancy specimens on exhibition have either been purchased from dealers or donated by fanciers.

Common Goldfish. The common goldfish very much resembles the carp to which family it is closely allied. Where they are kept under ideal conditions they grow to a length of from twelve to fifteen inches. The people of Korea, China, and Japan are given credit for first establishing the gold fish as an ornamental pet. While not all goldfish are golden in color, it is thought that the name has been given to the entire genus because the first fish introduced into Europe were golden in color. The common variety runs in many shades of red or gold, white or pearl, olive grey and part black, or a combination of the above colors. The brilliant colors have been fairly well established by selective breeding; however, we are told that the root stock was olive grey or carp color. The tendency is so great in some specimens to revert, that they retain the carp color and are known to the fanciers as uncolored. All scaled varieties of goldfish pass through the uncolored stage. They do not begin to take on the more desirable shades until they have reached the age of several weeks or more. The white or albino specimens are called pearl color. In the aquarium can be seen the various colors and combinations of colors of the common goldfish.

Among the fancy breeds of goldfish are found a number of types of both the scaled and scaleless varieties. The so-called scaleless varieties are not entirely without scales, but the scales are of such transparency that they are seen with difficulty. They are found in a great many different colors, and combinations of colors, known as calicoes. These fancy little fish, with their various colors, shapes, and fin construction were produced by selective breeding.

The specimens mentioned below by no means complete the list of fancy gold fish but are the ones that generally can be seen in the hatchery aquarium.

The Comet Goldfish. This fish is long of body and fin, the tail and pectoral fins being exceptionally long and free flowing. In movement it is perhaps the most graceful of all fancy goldfish.

The Shubunkin Goldfish. The Shubunkin is simply a transparently scaled common goldfish. They are found in many different colors and in combinations of colors.

The Fringetail. We are lead to believe that the Fringetail goldfish was introduced into this country in a collection sent to the Chicago World's Fair by the Japanese Government. The characteristic points of this species are a short, round, or chunky body, a short head, the lower fins all paired and long, and the dorsal fin as high as the body is deep. They are found in a variety of colors in both the scaled and scaleless breed.

Telescope Eye. These curious specimens are simply what the name implies; in conformation they very much resemble the Fringetail with the exception that the eyes protrude, suggestive of a telescope. In the early weeks of the fish's life the eyes appear normal, the unusual development starts when they are from three to four months old.

The Moor Goldfish. This is the name generally applied to a black goldfish. Good specimens are of a deep velvety black; the blackness should extend to all parts of its body with a possible exception of the underside of the belly, which probably will be a shade lighter. For some undiscovered reason good Moor specimens are rarely found except in the Telescope variety.

BOWFIN OR DOG FISH

These fish are found in the Great Lakes, the Mississippi Valley, and a few streams of the southern Atlantic Coast. While they are considered almost worthless as a pan fish, they are of much interest to the scientists for the reason that their air bladder is developed into cells and a half developed lung. Because of this, it will probably live longer out of water than any other American fish. In the still aquarium, where oxygen is scarce, it can be seen from time to time to rise to the surface and inhale air through the mouth. It grows to a length of several feet.

HELLBENDER

In Pennsylvania these unpleasing creatures are commonly found in the Susquehanna River where they are known as mud puppies. They grow to a length of from eighteen to twenty inches. They feed upon worms, crawfish, tadpoles, fish, and fish eggs, and much to the fisherman's disgust often take the hook. In conformation, they are very odd; the body is very much flattened; the tail also flattened but attached vertically to the body, and running parallel with the body on each side are folds of loose skin. Specimens in the aquarium are very seldom perfectly still. They usually lie on the sandy bottom rocking the body from side to side.

COMMON BULLFROG

These are the chaps that send forth the deep bass voice from the shores of the lakes and ponds in the spring. They are the largest of Pennsylvania's frogs, some mature specimens measuring sixteen inches over all; however, they vary greatly in size due probably to conditions and environment. They feed upon practically all forms of small life found in and about the ponds. In fact they will devour almost any moving object that they can swallow or partly swallow, including flies, small birds, fish worms, and tadpoles, and will revert to cannibalism; that is, feeding upon the smaller of their own kind.

Locally they spawn in June or July. The development from the egg to the perfect frog is an interesting and long drawn out affair. Scientifically they belong to the family of Amphibia which if literally translated from the Greek means a creature of two lives. This is true of the frog, as the ovum or egg does not hatch into a frog but into a tadpole and later develops into a frog. The eggs are deposited upon the surface of aquatic plants, twigs, brush, etc., in the form of a gelatinous mass. These hatch into bullfrog tadpoles.

The tadpoles of this species of frog do not develop into the perfect frog the first season but transformation usually takes place the following June or July. Specimens of tadpoles in the various stages of development and of the mature frog can usually be seen in the display tanks.

LEOPARD FROG

The Leopard frog is perhaps more widely known than the bullfrog for the reason that it is not as aquatic in habit, but is commonly seen by the roadside, in the fields, and in the swamps, also along the edge of ponds and streams. However, during spawning season, which occurs in the spring of the year, they seek the water. The young go through a period of transformation similar to that of the bullfrog, but the transformation takes place the first season.

COMMON WATER SNAKE

These reptiles are common from Maine and southern Canada to North Carolina, inclusive, and westward to Kansas. They are very aquatic in habit being chiefly found along the border of rivers, streams, ponds or lakes. They are very expert fishermen, living almost exclusively upon fish, frogs, tadpoles, etc.

TURTLES, TERRAPIN AND TORTOISES

Visitors frequently ask what is the difference between the turtle, the terrapin, and the tortoise. Hornaday has the following to say: "In the original classification of land going tortoises, and the water loving turtles or terrapin it was an unfortunate mistake that the name tortoise was not limited to the dry land species, the terrapin to the hard shelled species inhabiting fresh water, and turtles to the species with flippers which inhabit the sea. Today the names tortoise and turtles are applied so indiscriminately throughout all three of these groups mentioned that they are useless as distinctive titles......................."

Ditmars says: "The North American Chelonia is composed of tortoise, turtles, and terrapin, the two latter names are employed rather indiscriminately in different parts of this country but the appellation, terrapin, is generally applied to hard shell, fresh water species that are edible and consequently have a market value. The tortoise are strictly terrestrial."

THE COMMON SNAPPING TURTLE

These reptiles enjoy a wide distribution throughout North America. They are known from southern Canada and the United States, generally east of the Rocky Mountains southward through Mexico to Ecuador. They are the largest of the turtles found in Pennsylvania. It is not unusual to find specimens weighing thirty pounds or more. They are very ferocious and in defending themselves strike in a like fashion to the snake. So quick is the movement of the head when striking that the human eye is barely able to follow it. The rapidity with which they are able to strike helps them to obtain their food with little effort. They are very aquatic and when lying upon the pond bottom, partly buried in mud, very much resemble moss covered rock. As an unsuspecting fish swims by, it is quickly grasped by the lightning like flash of the head and neck. They are an edible species and hundreds are sold in the market each year. The specimens on exhibition were taken from a lake in Wayne County Their diet consists chiefly of fish and chopped meat.

THE YELLOW-BELLIED TERRAPIN

The range of these terrapin, we are told, is restricted to the pools of stagnant water and marshes along the coast of Virginia and Georgia. They are edible and large numbers of them are sent to the market. The specimens on exhibition were obtained from a swamp in Georgia and are fed on chopped fish and meat.

FLORIDA TERRAPIN

Little information is obtainable in reference to these turtles other than their range is restricted to Georgia and Florida. The captive specimens were obtained from a collector in southern Georgia. Their characteristic features are the small head and high dome-like shell.

WOOD TURTLE

Their habitat is northeastern United States. The specimens on exhibition were obtained from Dauphin county, Pennsylvania. They are not considered aquatic in habit but can swim very readily. The characteristic features of this species is the rough chiseled-like aspect of the upper shell and the bright brick red coloring of their fleshy parts. In captivity they feed upon lettuce leaves, berries, apples, meat and fish, but a part vegetable diet appears to be necessary for their well being.

PAINTED TURTLE

These beautifully marked turtles are found from New Brunswick to the Gulf of Mexico. In Pennsylvania they are probably more abundant than any other species. On sunny days during the summer months, they can be seen in practically all ponds or lakes throughout the state, basking on partly submerged logs, rocks, and marshes, sliding into the water with great rapidity when frightened. Their chief food in the aquarium consists of tadpoles, fish, meat and water plants.

GEOGRAPHIC OR MAP TURTLES

The name of this species is probably derived from its peculiar markings; however, much imagination has to be used to see any resemblance to a map. The range of these turtles in the United States is east of the Mississippi. The captive specimens were secured from a pond in Cumberland County, Pennsylvania. They are fed upon earth worms, meat, fish and aquatic plants.

SPOTTED TURTLES

These little turtles, which rarely exceed a length of over four inches, are commonly found in northeastern United States. The name is derived from the peculiar markings on the upper shell, the shell being black with numerous irregularly scattered, round yellow spots occurring on it. They are very aquatic and live on practically the same food as that of the painted turtle. The captive specimens were obtained from a creek in southern Pennsylvania.

COMMON MUSK TURTLE

Throughout its range, which extends from southern Canada to the Gulf of Mexico, this turtle is generally known as the mud turtle. They are very pugnacious and spend a great deal of their time crawling about on the bottom of the lake or stream which they inhabit, apparently in search of food. In the aquarium they live upon a fish diet. When handled these turtles throw off a strong, musky odor, hence the name.

SOUTHERN SOFT SHELL TURTLES

As the name indicates, the soft shell turtles lack the hard protective shells of the other species. The shell is exceedingly flat and of a soft, leathery character. Throughout their range they are commonly called the flap-jack turtle. The range of the southern soft shell turtle is from Georgia southward throughout Florida and westward to Louisiana. They are edible and command a high price on the market. In their natural habitat they probably feed chiefly upon fish life. The captive specimens are fed chopped meat. They are obtained from a lake in Georgia.